February 20, 2006

Chairman Vernon J. Ehlers
U.S. House of Representatives
Committee on Science
Suite 2320 Rayburn House Office Building
Washington, D.C. 20515-6301

Dear Chairman Ehlers and Members of the Committee on Science:

On behalf of Oregon Health & Science University (OHSU), I submit the following written testimony to the Environment, Technology, and Standards Subcommittee of the U.S. House of Representatives' Committee on Science. I serve as the chief information officer (CIO) for OHSU, a position I have held since 2001. In that role, I am responsible for information technology (IT) strategy and implementation for all missions of OHSU, including health care, education, research, and community service.

As Oregon's only academic health and science center, OHSU provides high-quality health care to more than 150,000 patients each year. The OHSU health care system offers the most comprehensive health care services in Oregon, including many innovative clinical care and diagnostic services. It is nationally recognized for clinical research and education, helping to develop tomorrow's health professionals.

At its core, OHSU is in the business of knowledge: creating it through advanced research, imparting it through excellent teaching, using it in effective and safe clinical care, and sharing it in service to the community. Information serves as the *currency* for knowledge—the method to develop, analyze, store, and distribute it. Effective IT solutions therefore are fundamental to our organization. In 2003, OHSU adopted the Strategic Information Plan that establishes a compelling vision for the IT-enabled organization and sets forth goals and objectives in ten key strategic areas. Among the key strategic areas are health care, business intelligence, information security and privacy, and technology and infrastructure. OHSU has an extensive IT infrastructure requiring significant, on-going investment to sustain and grow. The organization invests just under three percent of its operating budget in IT.

Health care IT has gained significant national attention since the beginning of the decade. The health care sector, one of the largest in the U.S. economy, lags other industries in the use of IT to enhance efficiency, improve effectiveness, and achieve quality. President Bush included it as one of his administration's goals in the 2004 State of the Union address: "By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care." Landmark studies by the Institute of Medicine [*To Err Is Human: Building a Safer Health System* in 2000 and *Crossing the Quality Chasm: A New Health System for the 21st Century* in 2001] called for widespread adoption of IT solutions to enhance patient safety.

While calls for enhanced automation have increased, landmark research from OHSU demonstrates the lack of progress nationwide. In a 2002 study published in the *Journal of the American Medical Informatics Association*, Joan Ash PhD and the Provider Order Entry Team surveyed hospitals and found that fewer than ten percent had a fully implemented CPOE system. Of those, only one third achieved a high penetration with more than 90 percent of orders entered through a health care IT system.

As a health care CIO, I believe that in the absence of a comprehensive health care IT infrastructure, our industry will be unable to achieve its goals of patient safety, clinical effectiveness, and operational efficiency. Health care is highly information-dependent. Clinical decisions are made minute by minute and require access to patient-specific data and expert clinical knowledge. An objective that resonates with our role as an academic health institution, we need to implement systematic tools so that all of us know what the best of us knows.

From my perspective within a provider organization, the health care IT sector is beginning to deliver comprehensive IT solutions that effectively meet our needs as users. Our industry traditionally has developed niche systems (patient financial, patient management/scheduling, laboratory, pharmacy, etc.) that were interfaced where possible and practical. While much attention is being paid to sharing information across institutional boundaries and among community providers, many systems have been limited in their ability to exchange information within the hospital's four walls. The goal of a comprehensive, patient-centered, paperless electronic health record (EHR) remains a futuristic goal for the vast majority of health care providers.

1. How does OHSU use healthcare-specific information technology? What benefits has OHSU realized so far? What future benefits are expected from this kind of technology?

OHSU's health care IT infrastructure supports its patient care functions (ancillary testing and reporting, pharmacy, digital radiology, order entry); safety and quality functions (infection control, data warehousing, trend monitoring); and administrative and business functions (admitting/ discharge/transfer, scheduling, patient billing). OHSU has been a long-standing user of health care IT dating back to early internal development efforts in the 1970s. In the mid 1980s, OHSU became one of the first sites in the country to implement Shared Medical Systems' (SMS, now Siemens Health Services) Independence system, a platform we continue to rely on today. Through the Integrated Advanced Information Management System grant from the National Library of Medicine, we developed a physicians' workstation as an early attempt to combine disparate sources of information into one portal. In the mid 1990s, OHSU deployed the Siemens Lifetime Clinical Record which has grown to be one of the vendor's largest longitudinal repositories of clinical data. OHSU also implemented clerical order entry and communication, effectively eliminating paper order transmittal from outpatient clinics and inpatient units.

The Information Technology Group (ITG) maintains this extensive health care IT infrastructure. Roughly two-thirds of our annual $30 million budget supports the hospital's IT services. Nearly 120 IT professionals are dedicated to our health care mission. These individuals maintain over 100 different IT applications on a multitude of hardware and database technologies; design, code, and manage over 80 different interfaces that exchange critical clinical data among the disparate systems; install and support over 5,000 personal computers deployed throughout the institution; manage over

400 active health care IT projects; and train many hundreds of physicians, nurses, and other members of the health care team.

OHSU continues to make considerable investment in health care IT solutions building upon the core patient administrative and clinical repository system. Our model remains to implement commercially available software solutions ("buy" versus "build") and to make limited but necessary local modifications and customizations. Since Year 2000, OHSU has invested over $50 million in capital for both enterprise and departmental health care IT solutions. As is common with academic health centers, we historically have been "best of breed" in our approach to commercial software, seeking the optimal solution for each unique application and interfacing it to the common core. Supported by positive industry developments, however, OHSU is embracing a strategy that minimizes data interfaces and strives for integration.

Early this decade OHSU make the strategic decision to invest in an electronic health record (EHR), starting with ambulatory care and then proceeding to inpatient care and the emergency department. This strategy contemplates a fundamentally different use of IT in health care—rather than being a passive repository of clinical and administrative data, the delivery of health care itself will be transformed using IT. Members of the interdisciplinary health care team will document, order, and plan treatment on line. As significant as OHSU's past IT investments have been, health care practice is still based on paper charts. A single stay in the hospital may generate upwards of 100 pages of documentation, orders, vitals, and other relevant clinical data. To eliminate filing and improve ready access to information after the fact, OHSU implemented a document imaging solution to scan every piece of paper after discharge, but active inpatient care still relies on paper.

OHSU selected Epic Systems to provide our ambulatory EHR and have now deployed this advanced clinical IT solution in 7 outpatient practices. Before the $22 million investment was approved, an extensive return on investment calculation was performed. The project showed a positive net present value considering only hard benefits. These benefits included transcription savings, staff savings (reduced charge entry, medical records, and support staff), supplies and storage savings. So far, the results have validated—and in some cases, exceeded—the anticipated benefits. For instance, Family Medicine showed a reduction in transcription lines per month from a pre-live high of 94,093 to post-live of 1,743.

Quality outcomes are difficult to quantify as hard financial savings, but present the real strategic benefits of EHR. As OHSU moves to implement an enterprise EHR across inpatient, outpatient and ED, we anticipate significant benefits to patient care. We will provide direct, secure, on-line access to records by patients. Clinical decision making will be supported by best practice guidelines. Decision support rules will provide timely, data-driven input to physicians when ordering tests and treatment.

A personal story (note: no HIPAA implications) may illustrate the real benefits to patient care of this IT investment. Not only am I OHSU's CIO, I am also a patient. Since 2000, one focus of our investment has been diagnostic imaging services, with advanced technologies such as an entirely digital enterprise repository (Picture Archiving and Communication System), voice recognition, digital radiography, and secure external communication. Each was a major IT and clinical reengineering project. Overall, they have taken multiple years and countless hours of work. After all this effort, the results for patient care are clear. When I was recently referred for an X-ray exam,

my physician was able to review and share with me the completed results just 11 minutes after the study (all digital capture and read, voice recognition transcription, and secure email transmission of final results). Eighteen months prior, this normal exam would have taken at least 48 hours to be completed.

While OHSU's investments have been successful and the benefits real, we have yet to achieve what should be possible with a comprehensive EHR at OHSU. As early as 1970, Morris Collen MD published a seminal paper on the characteristics of a medical information system. A third of a century later, our industry has yet to witness widespread adoption of IT.

2. What incentives and barriers exist to the broader adoption of information technology in the health care industry, and are these financial, technical, or of some other nature? What has been OHSU's experience with these incentives and barriers?

From my perspective from helping craft our strategic vision for health care IT, the most significant incentive to a broad adoption of IT is the strongly held belief that IT is essential for the practice of medicine in the 21st century. As this institution planned to build health care facilities for the future, there was near unanimous approval for significant investment in an EHR solution. A compelling question was posed as we began to design the space: Should we really carve out clinical space in 2006 for a large paper file room in each practice setting? The EHR also was seen as vital to patient-centered care. Our tech-savvy customers in the Pacific Northwest are starting to expect the ability to email their physicians, schedule an appointment, review their child's immunization record, and pay their bill on line. This was an important incentive for OHSU's strategic decision to direct scarce capital dollars into IT.

While not an incentive per se, another source of support for widespread health care IT adoption comes from our role as an academic health center. Today's medical, nursing, and dental students were born after the invention of the personal computer and have grown up in the high-speed information age. In fact, to our X-box-generation residents, our systems sometimes feel as antiquated as Atari PONG. A tech-savvy workforce makes IT-enabled clinical practice an expectation.

To date, there have been few financial incentives to adopt EHRs within an institution or share data through Regional Health Information Organizations (RHIOs). While health care IT may enhance clinical quality and effectiveness, cost containment continues to be a driving factor in health care. Pay for performance, Federal government funding, and other programs have been debated, but nothing to date has translated into an economic support for this IT investment.

As studies have shown, only pioneering institutions have implemented comprehensive health care IT solutions—and some have resulted in significant failure. An article in the *LA Times* in 2003 reported the suspension of the multimillion-dollar computerized system for doctors at Cedars-Sinai Medical Center after significant physician complaints. A number of practitioner articles and scholarly studies have attempted to address barriers to successful implementation of EHR and health care IT solutions. I would propose that the major barriers include the expectations gap, technology barriers, and resource barriers—though the latter two may not be the traditional definition of these type of barriers.

In my opinion, a serious issue facing health care CIOs is an expectations and perception gap between the IT department and IT users and their senior leadership. Hospital leaders often believe IT should cost less and deliver more. It simply ought to be much easier; it is not. Complicating this gap is the extent of IT project failure or cost overruns. Any IT project has inherent risks and challenges; enterprise health care IT projects are extremely complex with competing requirements, multiple users, different data types, and complicated work flows and information needs. Looking broadly at all IT projects in the public and private sector, the Standish Group reported that only 16 percent of IT projects completed on time, budget, and scope. They estimated that U.S. companies and government agencies would spend $81 billion on canceled software projects in 1995 alone. Health care organizations may not recognize their extent of investment (time, resources, and capital) required or may not trust their IT department to deliver successfully.

OHSU is addressing this barrier in our ambulatory EHR deployment, though it is an on-going effort requiring continual dialogue. We have faced budget challenges—underestimating the complexity of system-to-system interfaces and the resources required to support such dramatic clinical practice transformation. We have built trust and mutual understanding, but this takes attention to sustain the relationship.

Another major barrier relates to technology. It is evident in the focus on interoperability standards and data exchange. I argue however that this focus addresses the symptom and not the underlying condition. From the perspective of a provider organization CIO, our industry suffers from too many "choices" rather than too few. Hospitals and physician groups face a staggering array of options for health care IT. IT units are often confronted with the Herculean task of trying to tie together these islands of information. At the Health Information and Management Systems Society (HIMSS) exposition in San Diego last week, there were over 800 different vendors showing IT software. You could purchase individual systems tailor-made to support diabetes care, cardiology care, intensive care, and home care. But what about the patient admitted with chest pain and complications from diabetes who requires an ICU stay and follow-up back at home? Should her record really be in four different systems (at best)? Can I guarantee that relevant clinical data from each is readily available to all?

With the paper record as the common denominator to all, this situation was not uncommon or particularly troublesome. Each system printed final documents and these were all filed in the integrated paper chart. (Relevant documents from outside providers were handled in the same manner.) Yet as we embrace the EHR, we are faced with the option of implementing a comprehensive, integrated platform or managing and interfacing multiple disparate solutions. Both paths have their challenges. As I stated earlier, OHSU is now starting to support the concept of global optimization, though sometimes sacrificing local customization. Changing our health care IT paradigm, however, is difficult—clinical users can make strong cases for their targeted, niche solution. Fortunately, the vendor marketplace is now producing products where integration does not require significant trade-offs in functionality.

Resources present another significant barrier to adoption and diffusion of health care IT. On the surface, one barrier is simply the cost of the software and hardware itself. Health care organizations face the challenge of diverting funds from facilities and clinical technology to invest in IT—often with a significant leap of faith. This investment is indeed significant. For OHSU, it was over $7 million.

The more significant resource barrier in my opinion is human resources: the clinician time to help design, develop, and implement a successful tool and the IT professionals to build and maintain the technology. Many studies of health care IT successes and failures have pointed to the need to engage clinicians in all aspects and phases of the project. EHR represents a significant modification to the work of all clinicians; they must be actively engaged to adopt the new tools. At OHSU, physicians must participate in 14 hours of classroom training just for the ambulatory EHR. We have found that this participation alone is not adequate. It requires a rethinking of the outpatient clinic encounter, their interaction with data, and their workflow. Each clinical specialty also requires up front design and build effort as well. Extensive work also will be required for our inpatient implementation, especially around nursing care.

With constant pressures to cut costs, there is little spare time for physicians, nurses, pharmacists, and other members of the health care team to engage in designing and implementing health care IT solutions. This may be a major hidden cost of implementation. As OHSU deploys our EHR to more ambulatory practices, we continue to find this barrier to success.

The other human resource barrier is finding IT professionals to assist with implementation. With more organizations planning for major EHR implementations, I have personally witnessed a growing shortage of qualified health care IT professionals to fill vacancies and hit the ground running. Hospitals turn to vendors and consulting firms to help, though they appear to face the same problems with recruitment and retention. OHSU's role as an academic health center may help—our department of medical informatics and clinical epidemiology can build the staff pipeline and I hope to develop with them some innovative programs to train individuals for advanced health care IT roles. However, I see a very significant problem looming as the industry at large embraces IT solutions.

Finally, I would like to make a comment about the barrier to RHIOs and sharing data across organizational boundaries. There are a host of technical, financial, legal, and regulatory barriers. Who benefits and who will pay? Is funding a duplicate, though clinically necessary, CT scan a disincentive to sharing clinical data? How do we ensure patient security under HIPAA's generally defined guidelines? How do I know that this "John Kenagy" is the same as that "John Kenagy"? With the right attention, priority, investment, and perseverance, these barriers can be overcome.

The more critical barrier today is that I cannot exchange what I do not have electronically in the first place. While the Portland market (and the Pacific Northwest in general) represents some of the most advanced IT systems in the U.S., we each have major EHR projects underway that will last through the end of the decade and serve as the core foundation piece for extensive data interchange. We need to proceed with our internal IT implementations in order to have the data to share. Nonetheless, the health care CIO community here is engaged in active dialogue to take demonstrable steps forward.

3. To what extent have the Department of Health and Human Services and the National Institute of Standards and Technology reached out to institutions like yours in an effort to develop a national strategy on Health IT?

OHSU has contributed significantly to the body of knowledge in health care informatics research and our Provider Order Entry Team (www.cpoe.org) has been awarded a number of grants for evaluating, interpreting, and disseminating evidence of computerized provider order entry success.

Apart from these research programs, OHSU's "production IT unit" with responsibility for implementing and maintaining our health care IT infrastructure has had little direct input into HHS or NIST efforts. Through a partnership with the Oregon Chapter of HIMSS, OHSU has been involved with several local efforts to understand and contribute to efforts such as the Certification Commission for Healthcare Information Technology (CCHIT) and other initiatives. However, these have mainly focused on education and awareness.

As a CIO who relies on the commercial marketplace for health care IT solutions, I believe that HHS and NIST needs to focus attention on the vendor community for standards adoption. As an institution, OHSU will not adopt the standards per se, but will look toward our product suppliers to be compliant and take advantage of the functions. Nonetheless, I recognize my power as a consumer—vendors are more likely to adopt standards if they feel it is an important requirement that makes a difference in product sales.

From my perspective at a major tertiary referral site, I am most keenly interested in basic data exchange between disparate information systems, especially as more hospitals and physician groups adopt EHRs. OHSU needs to receive relevant clinical data that led to a referral to our site and we need subsequently to transmit the results and follow-up plan of care to the referring physician. Exchange standards should be set to a lowest common denominator—even using Adobe portable document format and a manual process to match patients to enable information exchange now. My concern is that our industry will attempt to design the "perfect" IT solution that either cannot be implemented or assumes too much technology overhead (e.g., a regional or national patient index).

Developing standards for interoperability of health care data is an unbelievably complex undertaking and is fundamentally driven by expectations and requirements. For instance, does interoperability mean that I can begin my nursing documentation in a stand-alone ED system, continue it in an OR system, and add to it in an inpatient EHR? Is the allergy I document in one system replicated to everything else? Is that the desired level of interoperability? In implementing OHSU's ambulatory EHR, I face this problem today. Interfacing systems for simple demographic information (e.g., keeping patient address in synch) has been challenging and a resource drain. We were unable to address data exchange for patient allergies and stepped back to paper documentation on the inpatient side. With this experience, I have strongly encouraged OHSU to move toward a single integrated system. Even between sites with the same core vendor (Kaiser Northwest, OCHIN, and OHSU all have Epic) we cannot exchange data electronically. I am challenged to think that complete interoperability is possible, even if desirable.

It would be worthwhile for provider institutions like OHSU to play a more active role in establishing requirements and priorities, sharing our perspectives from the front line of dealing with multiple systems. I suggest that our involvement with HHS and NIST is not due to their lack of interest or mechanisms for input, but our time constraints and challenges at the local level. Standards seem so far off and I have end users needing attention now. Piqued by this question, however, I encourage HHS and NIST to make a greater concerted effort to seek provider CIO input. I will do my part to share my perspective as well.

4. What specific measures can the Federal or State governments take to help the broader adoption of health information technology?

The Federal and State governments play many roles in the health care sector. I suggest several important steps to enhance incentives to adopt health care IT.

- Continue and expand research funding in health care informatics. As EHRs and CPOE become more prevalent, these offer unparalleled opportunities to study the antecedents of and barriers to success.

- Expand support for training programs to develop clinical and IT professionals in the field of health care informatics. If the 90 percent of U.S. hospitals that do not have CPOE start to implement these systems, I fear we do not have the human resources to meet the need.

- Address the economic disincentives to invest in health care IT. The constant pressure to cut health care costs by reducing payments to hospital and doctors stands in direct opposition to requiring these entities to invest millions of dollars of capital and, more importantly, scarce clinical time in designing, testing, implementation, and using advanced IT systems.

- Work in partnership with the vendor community to address exchange of data among disparate EHRs and with emerging standards of personal health records (PHRs). I personally do not think strong government regulation of this industry is needed (e.g., FDA regulation of EHRs), but believe the market cannot and ultimately will not sustain the number that currently exist.

Thank you for the opportunity to share my perspectives as a provider-institution CIO. With 20 years experience in health care IT, I am very encouraged by recent developments. There is increasing attention and awareness of the important role IT must play in health care quality, safety, effectiveness, and efficiency. At the same time, the marketplace is maturing and products are emerging that can deliver comprehensive, patient-centered electronic health records. Barriers and challenges remain, but the ultimate goals compel us to strive ahead.

Sincerely,

John Jay Kenagy
Chief Information Officer